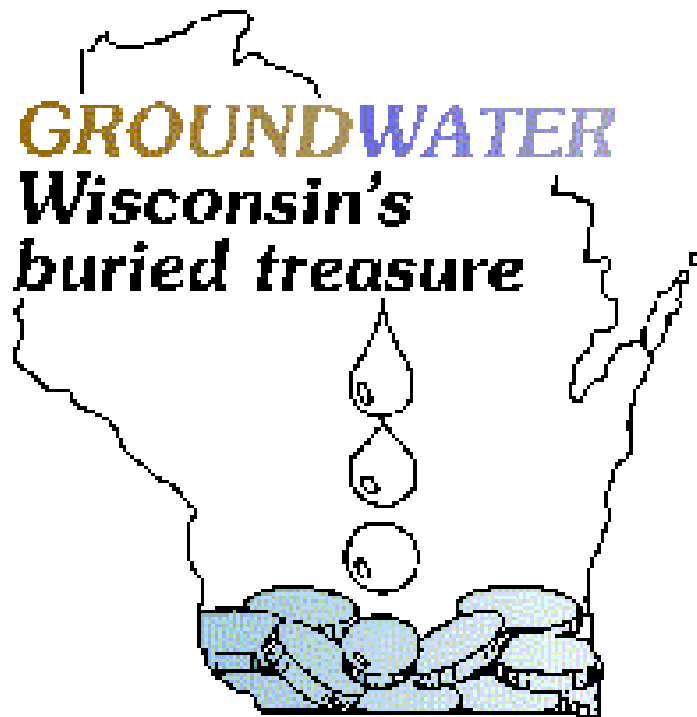


Sharing Our Buried Treasure: Directions for the Protection and Management of Wisconsin's Groundwater

A Summary of the 2001 Groundwater Summit



September 2002

Wisconsin Groundwater Coordinating Council

"Sharing Our Buried Treasure" charts a course for state and local programs involved in groundwater education, protection, and management. These ideas and directions, generated by participants in a Groundwater Summit sponsored by the Groundwater Coordinating Council and held in October of 2001, will guide cooperative efforts and set priorities for working together to protect groundwater and preserve its value as an economic and natural resource for future generations.

Introduction

In the summer of 2000, the Wisconsin Groundwater Coordinating Council (GCC)¹ initiated an effort to evaluate the state's role in protecting and managing groundwater resources, and to identify educational, research, planning, and policy needs for the future. A similar effort had been undertaken in 1991, with the gathering of key state agency personnel, researchers, educators, and local government representatives at a conference titled "Working Together to Manage Wisconsin's Groundwater: Next Steps?"² The GCC, its Subcommittees and partner agencies eventually implemented many of the recommendations from this conference, which focused on groundwater quality, state and local partnerships, and data management needs. However, many issues remain unresolved. Moreover, in the decade since this conference, issues related to groundwater quantity have risen to the

¹ The Groundwater Coordinating Council was created in 1984 as part of Wisconsin's comprehensive groundwater legislation. The GCC is directed to "serve as a means of increasing the efficiency and facilitating the effective functioning of state agencies in activities related to groundwater management [and] shall advise and assist state agencies in the coordination of nonregulatory programs and the exchange of information related to groundwater..." (s. 160.50, Wis. Stats.,). The GCC consists of 8 members who represent the 5 state agencies with groundwater management responsibilities (DNR, DOT, DHFS, DCOMM, and DATCP), the State Geologist, the University of Wisconsin System, and the Governor. More information can be found at the following website:
<http://www.dnr.state.wi.us/org/water/dwg/gcc/>

² Working Together to Manage Wisconsin's Groundwater - Next Steps? : Conference proceedings; March 15-16, 1991, University Center, University of Wisconsin--Stevens Point; Conference Coordinators: Stephen M. Born, Douglas A. Yanggen; Published by University of Wisconsin Extension, Geological and Natural History Survey, Madison, Wis. 113 p.

forefront of public discussion. Among them:

- an attempt by a bottled water company to locate a bottling plant in South-central Wisconsin;
- links between groundwater pumping, residential development, and arsenic contaminated wells in the Fox River Valley;
- concern about declining water tables and access to usable water supplies in southeast Wisconsin, Green Bay, and Fond du Lac areas; and
- documentation of altered hydrologic regimes due to excessive pumping in Dane County and the Central Sands.

Wisconsin's Groundwater Summit was conceived as a way to "take the pulse" of groundwater management activities, to gather input from key stakeholders, and to facilitate a dialogue among diverse viewpoints on these and other groundwater issues.

The Groundwater Summit

The Summit was held on October 30, 2001, in Waukesha, Wisconsin, and attracted 135 people representing a wide array of interests and viewpoints on future groundwater management needs. Invitations were sent to over 80 citizen and industry organizations, state agencies, tribal and local governments, and academic institutions, with a request to identify up to 2 representatives to attend the Summit. Over 50 organizations responded to the invitation (Table 1). Participants represented state, local and tribal agencies, elected officials, agricultural industry and farming groups, water utilities, environmental and conservation groups, business and industry groups, and the university research and outreach community.

Participants heard presentations on basic groundwater principles, current groundwater quality and quantity problems, the historical development of groundwater policy, and evaluations of current groundwater management activities. A group of panelists representing key groundwater user groups provided their perspectives on pressing groundwater issues and management needs.

The second half of the Summit involved dividing the large group among 8 smaller discussion groups, giving each participant a chance to express his or her views and opinions on future groundwater management needs. Each small group was led by an experienced facilitator and was composed of people representing a mix of organizations to achieve a balance of viewpoints. It was a unique opportunity for dialogue among people who do not usually discuss groundwater priorities. Individual comments, as well as topic areas and major themes, were captured for each group and organized roughly into quantity or quality issues, and educational, research, or policy needs. At the close of the Summit, organizers summarized each group's discussion and provided a synthesis of the key themes that were raised.

Most attendees to the Summit expressed that the primary issue for the next decade is managing quantity, as well as quality. Such themes as long term monitoring, water conservation, regionalization, public education, groundwater protection, the hydrological connections between surface and groundwater, and the continued management of water quality augment and support the basic issue of developing a comprehensive, science based groundwater management approach that is equitable to all users. **However, there was *not* a consensus on how to accomplish this or which approach was best suited for Wisconsin.**

Sharing Our Buried Treasure

Sharing Our Buried Treasure serves as a means of summarizing and synthesizing the key themes that were raised at the Groundwater Summit³. However, it is not intended to represent a consensus of the participants, nor the agencies and organizations that they represent. Rather it serves as a starting point for further dialogue about the future of Wisconsin's groundwater management.

This Summary was drafted by a core group of groundwater professionals affiliated with the GCC, including chairs of the GCC Subcommittees and representatives of each of the agencies and institutions that make up the GCC⁴. It was the intention of the core group to stay true to the discussion and viewpoints expressed at the Summit, while bringing some level of synthesis and common understanding into the document. Every effort was made to provide a balanced discussion of the themes and visions presented herein. Summit participants were given an opportunity to comment on the initial draft of this document and many of their comments were incorporated into the final version.

Sharing Our Buried Treasure is divided into nine Key Themes (in no particular order of importance):

³ Other products of the Summit include full conference proceedings, a complete compilation of breakout session comments, and a website with links to a number of additional resources (<http://www.dnr.state.wi.us/org/water/dwg/gcc/GCC-GWSUMMIT.HTM>)

⁴ Core group members include: Lynita Docken (Commerce); Chris Mechenich and George Kraft (CWGC); Jim Vanden Brook (DATCP); Tim Asplund, Jeff Helmuth, Mike Lemcke, and Dave Lindorff (DNR); Bob Pearson (DOT); Jim Krohelski (USGS); Steve Born (UW-Madison); Ken Bradbury and Ron Hennings (WGNHS).

- A. Clarifying "Whose Water is it?"
- B. Recognizing the Connections Between Groundwater and Surface Water
- C. Evaluating and Managing Threats to Groundwater Quality
- D. Linking Land Use Planning and Groundwater Protection
- E. Developing a Comprehensive Approach to Groundwater Quantity
- F. Addressing Water Use and Conservation Issues
- G. Exploring Options for Regionalization of Water Management
- H. Building a Groundwater Constituency through Public Education and Involvement
- I. Collecting Long-Term Groundwater Data to Address Long-term Problems

Each Theme is further developed with a corresponding Vision Statement, Narrative, and list of Potential Strategies. *Vision Statements* are brief expressions of a future desired state relative to the Theme. The *Narratives* flesh out the Theme even further and provide some structure and context for the specific strategies. The *Potential Strategies* represent specific comments or summaries of comments made by Summit participants during the breakout sessions and captured by the facilitators.

Again, the visions, narratives, and potential strategies do not reflect a consensus view of all Summit participants, nor do they necessarily represent the viewpoints of the GCC or its member agencies. Indeed, several of the strategies vary in their level of detail, may conflict with one another, and may be unworkable in the current framework of groundwater management. In addition, the list of strategies is not intended to cover all of the possible approaches to a specific problem. Rather, the strategies suggest some possible directions and set forth a

framework for future groundwater management activities (e.g., defining research priorities, guiding agency planning, finding collaborative solutions, evaluating decision-making processes, etc.).

It is the hope of the GCC that the ideas and directions presented here can serve as a common framework for ALL who have a stake in the future of Wisconsin's "Buried Treasure."

Guiding Principles

A number of overall principles or assumptions were echoed by many of the speakers and participants in their discussion at the Groundwater Summit. These Guiding Principles touch on all of the Key Themes that follow and should serve as a framework for further discussion.

Wisconsin's approach to groundwater management and protection should:

- *Ensure sustainable and safe drinking water supplies for all Wisconsinites and future generations*
- *Preserve the hydrologic cycle for proper functioning of aquatic ecosystems*
- *Recognize the economic value of a safe and adequate water supply for food production and industrial uses*
- *Recognize the intrinsic value of springs, naturally flowing wells, and groundwater-fed surface waters*
- *Recognize that Wisconsin's groundwater has limits to its abundance and must be managed and used wisely*
- *Rethink traditional distinctions between quality and quantity, surface water and groundwater, land use and water use, watershed and aquifer, in how groundwater is managed*
- *Reflect cooperative management at state, regional, local levels, as well as public/private partnerships*

Key Themes

A. Clarifying "Whose Water is it?"

The Vision

Groundwater is recognized as a vital resource of the citizens of the state, and the state must manage and regulate its use within its borders.

Narrative

The Public Trust Doctrine as interpreted through statute and case law provides that navigable waters of the state shall be held in public trust for its citizens. This view has held firm for surface waters of the state, and has been expanded to protect water quality, but has not been explicitly applied to groundwater. Indeed, groundwater is considered by the courts to be a private property right, subject only to the "reasonable use" standard - that a person is permitted to withdraw water in any amount provided it does not cause unreasonable harm to a neighboring property owner. Statutory authority is limited to denying permits for high capacity wells that negatively impact a public (municipal) water system. With the recent outcry generated by a proposal to site a bottling plant in the vicinity of a naturally flowing spring, the state's limited authority to protect surface waters or private wells from groundwater withdrawals was made apparent.

Also made apparent by the water bottling proposal was the growing demand for fresh water worldwide, which has made "water rich" states such as Wisconsin attractive as a resource for the large-scale exportation of water. Another issue is the privatization of water utilities to create economic efficiencies and better deal with failing infrastructure and increased technological

costs of treatment. These trends have caused some to question whether water should be considered a public resource or good, in which case the state should have authority to regulate its use, or a commodity or private good, in which case markets and private companies should ultimately determine its use and value. Wisconsin citizens need to engage in this discussion to ensure the long-term sustainability of its water resources.

Potential Strategies

1. Pursue statutory clarification of the Public Trust Doctrine as it pertains to groundwater.
2. Promote discussion of state's role in regulating groundwater withdrawals in a variety of forums.
3. Put safeguards into place to ensure state review of large-scale water withdrawals and exportation.
4. Investigate alternatives to the current mechanism of water rights as it pertains to groundwater use (i.e. how to balance rights of private well owners vs. public water systems).
5. Expand the ability of the state to consider impacts to non-municipal wells and aquatic ecosystems in reviewing high capacity well permits.
6. Evaluate how international agreements (e.g. NAFTA, Great Lakes Charter) may supersede or limit State and local regulation of water withdrawals.

B. Recognizing the Connections Between Groundwater and Surface Water

The Vision

Groundwater and surface water are managed in an integrated fashion, with connections between infiltration (groundwater recharge), surface runoff, groundwater withdrawals,

evapotranspiration, and stream baseflow clearly acknowledged.

Narrative

Groundwater and surface water resources (lakes, streams, springs, and wetlands) are intimately connected throughout Wisconsin. Groundwater maintains the baseflow of streams and the entire flow of springs. Groundwater resources often control surface water levels in lakes and wetlands. Groundwater inputs are critical for ecosystem functioning. Infiltration and recharge of water at the land surface replenishes groundwater supplies. Dissolved materials, including both natural constituents and contaminants, are exchanged between groundwater and surface water features.

In natural systems there are physical and chemical balances in the movement of water between groundwater and surface water resources. Our activities can alter these balances in unintended ways. Pumping from water supply wells can affect nearby lakes, streams, or wetlands by removing groundwater that would have naturally discharged there. Changing land use through urbanization, construction, or altered farming practices can affect groundwater recharge rates and groundwater quality. These changes in balance can affect changes in flora and fauna and ultimately alter biotic systems.

Currently, groundwater and surface water in Wisconsin are often thought of and treated, both legally and in the public's perception, as separate resources. However, groundwater and surface water are really parts of a whole - integral components of the water cycle. Recognition, by the legal system, by resource managers, and by the public, of this continuum is essential to the

future health of all of Wisconsin's water resources.

Potential Strategies

1. Develop ways to estimate the quantity of water that can be withdrawn without long-term adverse impacts on ecosystem functioning (streams, springs, and wetlands).
2. Encourage communication and coordination among programs that deal with different components of the hydrologic cycle, including runoff, infiltration, and recharge.
3. Add language to explicitly define the interconnectedness of surface water and groundwater in new and existing codes and statutes.
4. Use regional hydrogeologic models to predict impacts on surface waters of different pumping regimes, altered recharge rates, and growth and development scenarios.
5. Pursue ways to integrate management of surface water and groundwater within and across agency programs.
6. Strive to maintain the natural water balance (recharge, runoff, evapotranspiration) in all activities that influence the landscape.

C. Evaluating and Managing Threats to Groundwater Quality

The Vision

Wisconsin takes a proactive approach to groundwater quality protection. Standards are in place for individual contaminants and mixtures. Private well water quality is managed in accordance with public health protection.

Narrative

The Groundwater Law⁵ can comprehensively address groundwater quality concerns by triggering modification of activities that contribute a contaminating substance to groundwater, as long as those activities are regulated by a state agency and standards have been established. However, standards require adequate human health and groundwater monitoring data, and these data are not available for many potential contaminants. Moreover there is a lack of data and understanding concerning the cumulative risks or synergistic impacts of multiple contaminants.

Setting appropriate standards for contaminants, and then minimizing their occurrence in groundwater, requires coordination and priority setting by appropriate agencies and research institutions. Even if the process proceeds smoothly, responses are reactionary in nature. Contamination can be widespread before action is taken. In the case of nitrate, with responsibility divided among several agencies, very little regulatory action has been taken despite nitrate exceeding the enforcement standard more frequently than any other contaminant.

One component of the Groundwater Law that has been called into question is its approach towards aquifer classification: the practice of classifying aquifers according to use, value and vulnerability. The Wisconsin approach treats all groundwater as potential drinking water, effectively employing the “precautionary principle” and preserving future options, given the uncertainty of future water use and stressors and our limited scientific understanding of

hydrogeologic systems. However, one result of this approach has been the expenditure of millions of dollars cleaning up contaminant plumes in soils and groundwater that may not become water supply sources. Critics of the present approach argue for targeting efforts towards protecting potable water supplies, and generally favor the new standards allowing flexible closure of contaminated sites. There would be value in a public dialog reaffirming or explicitly rethinking our state policy regarding aquifer protection and classification.

Activities that manipulate the groundwater resource such as pumping and aquifer storage and recovery (ASR) may also impact water quality. Fluctuating groundwater levels may be contributing to arsenic contamination, pumping of water into aquifers may affect groundwater chemistry, and modifications of discharge rates to surface waters may affect surface water quality. Addressing groundwater quality concerns in a proactive manner will require greater efforts to evaluate risks and establish mitigation measures before potentially contaminating activities commence.

Potential Strategies

1. Reevaluate the role of Enforcement Standards (ES) and Preventive Action Limits (PAL) in preventing groundwater contamination.
2. Revisit the issue of aquifer classification for certain applications (e.g. aquifer storage and recovery, remediation, source water protection).
3. Examine and improve security for groundwater supplies to protect against acts of terror or vandalism.
4. Develop an approach for dealing with presence of multiple contaminants and

⁵ The "Groundwater Law" (1983 Wisconsin Act 410) was enacted in 1984 and is administered through Chapter 160 of the Wisconsin Statutes.

potential cumulative or synergistic health risks.

5. Find better ways to communicate risks of contaminants in private well water supplies.
6. Collect data on and develop groundwater standards for "emerging" contaminants (e.g. pharmaceuticals, pesticide metabolites, and viruses).
7. Develop a "sentinel well" monitoring system for detecting potential threats to water quality.
8. Establish inventories of chemical use (as already exists for pesticides) to determine priorities for monitoring
9. Provide incentives and alternative practices for reducing use of fertilizers.
10. Require more frequent testing of private wells for bacteria and nitrate.
11. Find innovative ways to deal with already elevated levels of nitrate in some rural areas.
12. Set effluent limitations for point source discharges to disappearing streams and karst features.
13. Seek consistency in applying regulations and standards among all entities charged with administering the Groundwater Law.
14. Explore the role of the "precautionary principle" in setting standards for "emerging" substances.
15. Seek ways to integrate water quality and quantity management within and across agency programs.

D. Linking Land Use Planning and Groundwater Protection

The Vision

Land use practices are undertaken with full consideration of the implications for groundwater quality and quantity. Strategies are developed that encourage local

governments to consider groundwater protection as a high priority in their land use and development decision-making process.

Narrative

Now is a critical time to be thinking about groundwater and its relationship to land use. Legislation enacted in 1999 provides a framework for development of comprehensive plans by Wisconsin municipalities.⁶ The new comprehensive planning legislation, sometimes referred to as the Smart Growth law, requires that any land use action taken by a municipality after January 1, 2010, must be consistent with that municipality's adopted comprehensive plan. The law further requires that each comprehensive plan address 9 elements – issues and opportunities, housing, transportation, utilities and community facilities, agricultural, natural and cultural resources, economic development, intergovernmental cooperation, land use and implementation. Most communities may think about groundwater protection in relation to the agricultural, natural and cultural resources element, but groundwater can be considered in each of the other elements as well.

At the same time that local communities are thinking about comprehensive planning, information is being generated to assist local communities through the source water assessment program. The 1996 amendments to the Safe Drinking Water Act required that each state complete the following steps for each public water supply – (1) delineate the land area that contributes water to their drinking water system – the source water area, (2) inventory potential contaminant sources within the source water area, (3)

⁶ Wisconsin's Comprehensive Planning Legislation (1999 Wisconsin Act 9) is codified in Chapter 66 of the Wisconsin Statutes.

determine the susceptibility of each public water supply system to contamination, and (4) make the assessments available to the public. The source water assessments will be completed in 2003 or 2004. Once these assessments have been completed and made available for all public systems, communities will be encouraged to use the source water assessment information to develop a management plan for protecting their water supply.⁷

These activities provide a unique opportunity to promote groundwater protection through wise land use practices and planning at the local level. These circumstances also provide an opportunity for state agencies to share information regarding our valuable groundwater resources and to develop better working relationships between state and local units of government.

Potential Strategies

1. Provide information on potential contamination sources and water supply susceptibility within source water protection areas to local planning agencies.
2. Develop tools and provide information to help local communities protect their water supplies in their comprehensive planning activities ("Smart Growth").
 - a. Promote use of "conservation" subdivisions (clustered development with greenspace between clusters) and community water supplies to ensure water quality.
 - b. Encourage protection of groundwater recharge areas through state and

⁷ One way to help communities implement these plans and protect their water supply, is through the Wisconsin DNR's wellhead protection program (see <http://www.dnr.state.wi.us/org/water/dwg/gw/whp.htm>).

- local public land purchases, as well as zoning ordinances.
 - c. Develop model ordinances for new developments and subdivisions that require stormwater infiltration practices.
 - d. Develop options for limiting certain land use practices within designated wellhead protection areas.
 - e. Create incentives to preserve woodlots and plant trees to promote infiltration.
 - f. Promote soil conservation practices that reduce runoff and erosion and promote infiltration.
3. Continue to fund management practice monitoring projects to identify how best to manage potential groundwater threats.
 - a. Determine and promote appropriate land application rates of fertilizers and pesticides.
 - b. Assess long-term impacts on groundwater quality of new technologies for onsite wastewater treatment.

E. Developing a Comprehensive Approach to Groundwater Quantity

The Vision

Wisconsin's groundwater quantity management provides for the sustainable development and use of this renewable resource and the equitable treatment of all users. As such, it mitigates and prevents well interference among competing users, deterioration of groundwater quality, and deterioration to aquatic systems (springs, streams, wetlands, and their associated plant and animal communities).

Narrative

Groundwater is an intimate part of Wisconsin's economic and environmental

vitality. Three-fourths of Wisconsin citizens use groundwater daily for their domestic needs and 95% of municipalities use groundwater for their public water supplies. Almost all the water for agriculture - livestock, crop irrigation, milking operation, and others - comes from groundwater, as does one third of industrial water and over half of commercial-use water. Our lakes, streams, and wetlands are also fed by groundwater, as are the fish, fowl, and other creatures that live in or near them.

Awareness is building that our groundwater resource, while abundant, is not infinite: water pumped in one location deprives another location of that same water. In places, the unmanaged pumping of groundwater has caused dramatic dropping of water tables, a decrease in water quality (arsenic, radioactive materials, increased salinity), and reduced flows to streams, springs, and wetlands.

One might think that an asset as valuable as groundwater would be carefully managed, much as a family trust or retirement portfolio. Such is not the case. Laws governing groundwater withdrawals are limited. Weak management may have been less of a problem in the past when demands on the resource were smaller, but increasing demands from a growing population and a successful economy now make good management a necessity. Good management is consistent with both a healthy environment and a healthy economy.

Potential Strategies

1. Encourage legislature to evaluate and potentially reform existing high capacity well laws in the state.
2. Develop a Statewide Groundwater Quantity Plan that addresses long-term

groundwater management needs tailored to specific regional aquifer systems.

3. Set benchmarks for groundwater withdrawals, similar to the Preventive Action Limit (PAL) process, to trigger conservation measures.
4. Promote optimization of well siting and withdrawals to reduce drawdown, preserve water quality, and protect highly valued resources.
5. Build on and link local and regional groundwater flow models to get a picture of statewide groundwater quantity trends.
6. Foster cooperative efforts and voluntary actions between various parties to solve groundwater resource problems (e.g. cooperative effort by the River Alliance and Potato and Vegetable Growers).
7. Seek ways to integrate water quality and quantity management within and across agency programs.
8. Collect detailed pumping records from public and high capacity wells to better manage the resource.
9. Promote infiltration of stormwater in new development and protect recharge areas.

F. Addressing Water Use and Conservation Issues

The Vision

Water is recognized as a finite resource. Users consider and react appropriately to the water they consume and return to the environment. State and local agencies and organizations work together to promote sustainable water use practices at the individual, household, industry, and community level and provide the data needed to assist in making informed decisions.

Narrative

Water conservation (meaning both more efficient use and demand reduction) has long been a mainstay of water resources management, not only in much of the arid West, but in states like Florida with its wet-dry cycles and seasonal demands. With more people and increased competing demands -- including the needs of a healthy aquatic environment -- the time has come for water-rich Wisconsinites to evaluate and possibly modify our appetites for water. Many options exist at both at the individual and community level for effective and efficient water conservation practices.

One way to address water conservation is to reexamine water utility rates. Wisconsin's long history in this area has focused on establishing an equitable rate structure and responsible fiscal management for water utilities. However, the Public Service Commission's (PSC) declining block rate structures provide no pricing signals to foster conservation among residential and public institutional users or large industrial customers. Utilities worry that reduced usage, a goal of water conservation, translates into reduced revenue streams and fiscal problems. However, by reducing the demand for water, the cost of maintaining and upgrading water supply infrastructure may be offset.

Another area to be explored is the idea of water reuse. For example, there are options for reusing stormwater and graywater for nonpotable purposes such as lawn-watering, flushing toilets, and irrigation. Industries or commercial sites may find that irrigation with stored stormwater has a triple bonus of water savings, groundwater recharge and natural nutrient application. However, the reuse of wastewater or stormwater, even for non-potable purposes, raises concerns about

ensuring public health and safety. As we deal with water quantity issues in Wisconsin, we will need to consider water conservation, pricing structures, and reuse as strategies in a comprehensive effort.

Potential Strategies

1. Promote water conservation incentives in new codes and rules dealing with water use and supply.
2. Develop a mechanism for prioritizing water uses (private wells, public drinking water systems, irrigation wells, industrial users, baseflow) when and where shortages occur.
3. Collect data and summarize annual pumping rates from all high capacity well permit holders.
4. Support and involve water utilities in promoting innovative efforts at water stewardship within their industry as well as with their customers (e.g. a rebate program for water saving fixtures).
5. Revisit water-pricing structures to promote conservation, both by individuals and large water users.
6. Review stormwater and wastewater treatment rules that allow for recycling and reuse to promote water conservation while protecting public health.
7. The PSC, working with the array of affected stakeholders, should undertake a study of alternative rate designs that influence customer behavior and favor water conservation.

G. Exploring Options for Regionalization of Water Management

The Vision

Groundwater is managed as a regional resource, transcending political boundaries, to better match aquifer boundaries or

groundwater basins and to be able to address and resolve problems at an appropriate scale.

Narrative

There is a spatial mismatch between the jurisdictions of local units of government and management entities and the resource being managed (aquifers and groundwater flow systems). Smaller communities and water utilities are unable to manage and protect water supplies for the longer-range future; their scope and jurisdiction is too limited. Regionalization (consolidation of utility management and operations across many communities, cooperative networks of communities/utilities) not only allows the problem to be effectively addressed, but can help achieve economies of scale and improved overall performance in water supply and protection. The challenge is in how to proceed – should we examine the possibilities of regionally-based water management, including the establishment of new regional authorities having the requisite management powers to achieve their goals? Should we expand the authority of Regional Planning Commissions to enable them to implement plans through binding reviews of permits? Or should we expand statutory authority to require agencies to consider regional water plans in their decision-making? Or would such changes in authority be politically unthinkable?

Regional hydrogeologic models are being developed for several areas of the state. For example, Dane County has an ongoing program involving federal and state resource management agencies and local water utilities to make use of information and computer models developed from a regional hydrological study. A similar effort in Southeastern Wisconsin has led to meetings of water utilities in the region aimed at

fostering cooperation. Institutional arrangements are needed that can utilize these models and our increased understanding of these regional groundwater systems. Legislation related to intergovernmental cooperation, utility services, and the establishment of joint local water authorities should be carefully reviewed for its potential in establishing regional institutions for groundwater management.⁸

Potential Strategies

1. Promote optimization of well siting and pumping rates on a regional basis.
2. Identify regions or areas with "critical" water quantity issues to apply special management strategies.
3. Promote water supply planning at the regional level, including linkages with population growth/change and land use plans.
4. Encourage formation of groundwater technical advisory committees tied to regional planning commissions and/or DNR watershed basins with representation from water utilities.
5. Develop and use regional hydrologic models to identify recharge areas and optimal pumping strategies.
6. Delineate groundwater basins to educate the public and to help identify the proper scale for management.
7. Investigate the use of regional water authorities (such as in Central Brown County) to manage water supply needs in other parts of the state.
8. Establish incentives for sharing resources among jurisdictions (wells, treatment and distribution systems) to better match supply and demand.
9. Manage groundwater and surface water as a single resource on a regional basis.

⁸ See Chap. 66, Wis. Statutes [especially 66.0301; 66.0813; 66.0823; 66.0827]

H. Building a Groundwater Constituency through Public Education and Involvement

The Vision

Wisconsin residents have a basic understanding of where groundwater comes from, its relationship to other water resources, the importance of drinking water testing, and the types of land use and land management practices that may protect groundwater, or contaminate or deplete it. They put this knowledge to work in personal and societal actions that protect both private and community water supplies and groundwater resources. They develop and exercise leadership skills, and assist in the education of their neighbors and elected officials. Informed citizen involvement and action effect the personal, societal and governmental changes necessary to ensure long-term sustainability of the groundwater resource.

Narrative

Many activities done on a daily basis by the average Wisconsin resident have the potential to affect groundwater resources. Thus, informed citizens are essential to groundwater protection. DNR and UW-Extension, along with other agencies and the help of the GCC Education Subcommittee, have produced an impressive collection of educational materials over the last 20 years.⁹ These include videos, public service announcements, brochures, magazines, a poster, a curriculum guide, and a physical model of groundwater movement. However, many people still do not understand the basics of groundwater movement, the processes of contamination,

or the need for water conservation. Partly, this lack of understanding relates to a shortage of people to carry out public education. However, there is also some complacency among citizens about Wisconsin's apparently abundant and high-quality water resources, as well as a belief that state and local regulatory agencies are able to repair or prevent all problems.

Building a groundwater constituency - developing the groundwater awareness and knowledge, as well as the leadership abilities of individual citizens- is essential to protecting groundwater over the long term. An active and involved constituency would advocate for sound groundwater management by governments and individuals on a daily basis, rather than reacting to periodic local crises. This constituency would not be merely the audience for groundwater education, but would also be requesters, facilitators, and providers of education for other audiences. They would identify local needs, bring in specialists when needed, and bring legitimacy and urgency to local education efforts.

Potential Strategies

1. Hold a "Groundwater Education Summit" to strategize and further develop innovative ideas for affecting knowledge, attitudes and behavior.
2. Revisit the idea of groundwater education for the state legislature. Involve citizens, Groundwater Guardian groups, school children, and other constituents of the legislators.
3. Use the annual GCC Report to the Legislature as a tool to promote groundwater management needs. Make the Report more easily searchable on the Web.

⁹ The Wisconsin Groundwater Education Resources Directory (1994) lists many of these resources. An updated version will be available in late 2002.

4. Hold groundwater seminars for local officials and planning commissions.
5. Continue groundwater education efforts for teachers and K-12 students.
6. Educate private well owners and drillers about the importance of monitoring and proper well construction
7. Educate the public and utilities about water conservation strategies at the household and community level.
8. Educate the public about water quantity issues and the interrelationship of groundwater and surface water.
9. Develop leadership and renewed interest within the environmental and conservation community on groundwater issues, especially identifying and involving interest groups with non-traditional ties to groundwater (e.g. fishing groups, lake groups).
10. Provide educational opportunities for citizen advocates on groundwater issues.
11. Promote and provide support for the "Groundwater Guardian" program within the state.
12. Add representatives of private laboratories, consultants, and industry to the Education Subcommittee of the GCC for the purpose of sharing strategies for public information.
13. Extend GCC Local Government Subcommittee membership to include representatives from nonprofit groups, industry, and/or water utilities.

I. Collecting Long-Term Groundwater Data to Address Long-term Problems

The Vision

Groundwater monitoring is strategically coordinated to establish background water quality and quantity, signal emerging threats, and evaluate best management practices.

Narrative

Wisconsin's Groundwater Law identifies four types of monitoring: 1) management practice monitoring; 2) problem assessment monitoring; 3) at-risk monitoring; and 4) regulatory monitoring. These types of monitoring are generally focused on addressing *quality* concerns and are often *short-term* in duration. Information from these types of monitoring is necessary to address immediate threats to groundwater quality.

However, the above monitoring does little to address groundwater *quantity* issues and addresses *long-term* quality problems as an afterthought. The State's long-term groundwater monitoring well network is the main mechanism to address groundwater quantity concerns. This network, while improved over recent years is limited to a very small set of wells. A network of monitoring wells, stream gages and climate stations are necessary to define baseline conditions and hydrologic trends. The design of the network should be representative of hydrologic conditions in watersheds throughout Wisconsin at a scale that is appropriate to supply data for management of water resources and completion of environmental assessments when development is proposed.

Long-term monitoring should include the measurement of groundwater levels in all of Wisconsin's water-bearing formations, reflecting both water-table conditions and deep confined and unconfined aquifers. It should include areas of groundwater development (pumping centers, both urban and rural, with large withdrawals) and undeveloped areas. In order to understand groundwater systems and the effect of groundwater development or climate change on groundwater systems, monitoring must

include stream flow, climate (meteorology), water use, and groundwater quality in addition to groundwater levels. Key parameters can be identified as indicators of groundwater quality to contain costs.

Potential Strategies

1. Seek funds for the maintenance and improvement of the existing groundwater monitoring well network, stream flow gaging stations and meteorological stations.
2. Expand the monitoring well network to include water quality observations.
3. Improve the accessibility of groundwater data systems.
4. Establish a strategic groundwater monitoring plan on a multi-year basis.
5. Seek ways to better integrate groundwater monitoring data among agencies and universities.
6. Use innovative technology (GIS, Internet Mapping applications) to provide better access to well data, as well as water quality and use information.
7. Explore alternatives to wells for recording ambient water quality data (i.e. stream baseflow sampling).

Next Steps (Implementation)

The Key Themes and Strategies presented in *Sharing Our Buried Treasure* represent a compilation and summary of groundwater management needs and directions identified by participants at the Groundwater Summit. The next step is to put these ideas into practice. A number of implementation strategies have been identified to make this Summary more widely available and to encourage its use as a guide for groundwater management in Wisconsin.

1. *Distribution of this Summary to agency, university, and local government partners, as well as organizations originally invited to attend the Summit.*

Hard copies of this Summary will be mailed to the original invitation list, all GCC members and their affiliated institutions, and libraries throughout the state. An electronic version will be made available on the GCC web page.¹⁰

2. *Presentation of this Summary to the Legislature as part of the GCC's Annual Report.*

The GCC as part of its charge, is instructed to submit an annual report which "summarizes the operations and activities of the council...describes the state of the groundwater resource and its management and sets forth the recommendations of the council. The annual report shall include a description of the current groundwater quality in the state, an assessment of groundwater management programs, information on the implementation of Chapter 160 and a list and description of current and

anticipated groundwater problems."¹¹

This Summary fulfills several of these requirements, and goes above and beyond the usual information presented.

3. *Endorsement of **Sharing Our Buried Treasure** by Summit participants and the organizations they represent.*

"Endorsement" means that the endorsing entity is willing to lend its name in support of *Sharing Our Buried Treasure*, as a statement of need for further dialogue and to express its willingness to work toward implementation of its sections and support of its goals. It does not mean that every entity supports every statement. It means that it is willing to "sign on" to the summary of pertinent issues it represents. An endorsing group is free to include with its endorsement a statement with any caveats or clarifications.

4. *Encourage individual agencies and groups to use **Sharing Our Buried Treasure** to evaluate their current groundwater management activities and develop specific strategies to achieve the visions and needs identified in this Summary.*

Instead of specifying which groups or agencies should carry out a specific strategy, all are encouraged to make use of this Summary in reviewing and developing their own management strategies (e.g., defining research priorities, guiding agency planning, finding collaborative solutions, evaluating decision-making processes, etc.). The GCC hopes that this Summary can provide a common framework or vision within which these strategies can be implemented.

¹⁰ <http://www.dnr.state.wi.us/org/water/dwg/gcc/>

¹¹ s.15.347 (13)(g) Wis. Stats.

5. *Provide opportunities for further citizen involvement and input through public forums and presentations on the Groundwater Summit outcomes and this Summary.*

Opportunities may include regional forums, presentations to Groundwater Guardian and other interested groups, and inviting continued feedback from Summit participants.

6. *Intentionally create linkages with the Waters of Wisconsin Initiative to address the longer term and bigger picture strategies presented in this Summary.*

The themes and strategies identified in this Summary will be incorporated into the Waters of Wisconsin Initiative of the Wisconsin Academy of Sciences, Arts and Letters¹² to the extent possible. Waters of Wisconsin aims to examine and analyze the current state and long-term sustainability of Wisconsin's waters through a process of informed discussion, including public participation and outreach activities, a statewide forum in October of 2002, and a report on the status and potential future of Wisconsin's water resources. Groundwater components of this initiative will draw extensively from the Groundwater Summit outcomes. The GCC intends to support the Academy's promotion of the Year of Water in 2003.

7. *Continued role for the GCC.*

The GCC will serve as an "institutional catalyst" to ensure that the ideas and directions presented in this Summary are made available to its member agencies, legislators, local and private interest groups and Wisconsin citizens. The GCC will develop its own goals and strategies to guide its activities in the next few years. In addition, the GCC will track and evaluate progress made on these strategies as they are implemented.

For more information on the Groundwater Coordinating Council and the Groundwater Summit, please contact Tim Asplund, GCC staff person at (608) 267-7449 or tim.asplund@dnr.state.wi.us.



¹² <http://www.wisconsinacademy.org/wow/index.html>

Table 1. Affiliations of Groundwater Summit Participants.

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|---|--|
| Carmody Data Systems, Inc. | U.S. Environmental Protection Agency - Region V |
| Center on Wisconsin Strategy | University of Wisconsin Extension |
| Central Wisconsin Groundwater Center | University of Wisconsin System |
| CH2M Hill | USDA Natural Resources Conservation Service |
| Concerned Citizens of Newport | UW Environmental Resources Center |
| Dane County Regional Planning Commission | UW Water Resources Institute |
| Dane County UW Extension | UW-Madison |
| Department of Agriculture, Trade, and Consumer Protection | UW-Milwaukee |
| Department of Commerce | UW-Oshkosh |
| Department of Health and Family Services | Waukesha County Environmental Health Division |
| Department of Justice | Wisconsin Academy of Sciences, Arts, and Letters |
| Department of Natural Resources | Wisconsin Agribusiness Council |
| Department of Transportation | Wisconsin Association of Land Conservation Employees |
| DeWitt Ross & Stevens | Wisconsin Builders Association |
| Dodge County UW Extension | Wisconsin Council of Trout Unlimited |
| Great Lakes Indian Fish and Wildlife Commission | Wisconsin Farm Bureau Federation |
| Ho-Chunk Nation | Wisconsin Fertilizer and Chemical Association |
| International Bottled Water Association | Wisconsin Geological and Natural History Survey |
| Layne Christensen Company | Wisconsin Groundwater Association |
| League of Wisconsin Municipalities | Wisconsin Land and Water Conservation Association |
| Municipal Environmental Group - Water Division | Wisconsin Manufacturers and Commerce |
| Policy Solutions, Ltd. | Wisconsin Pork Producers Association |
| River Alliance of Wisconsin | Wisconsin Potato and Vegetable Growers Association |
| Rock Basin UW Extension | Wisconsin Realtors Association |
| Rock County Planning & Development Agency | Wisconsin Rural Water Association |
| Ruekert * Mielke, Inc. | Wisconsin State Cranberry Growers Association |
| Sierra Club -- John Muir Chapter | Wisconsin State Laboratory of Hygiene |
| Southeastern Wisconsin Regional Planning Commission | Wisconsin Stewardship Network |
| Town of Blue Mounds, Dane County | Wisconsin Towns Association |
| Town of Mukwonago, Walworth County | Wisconsin Water Association |
| U. S. Geological Survey - Wisconsin District | Wisconsin Water Well Association |
| | Wisconsin Wildlife Federation |
